

REMARKS

Reconsideration and allowance of the subject application are respectfully requested.

Claims 1-65 are pending in the application. Claims 1, 2, 10, 11, 12 and 65 are independent.

Various claims in the present application have been amended to clarify the scope thereof. The nature of each amendment is discussed below and/or is apparent on the face of the amendment (e.g., to correct obvious grammatical errors). It is believed that no new subject matter has been entered by the amendments made herein.

Claims 1, 12-16, 37-39 and 52-53 were rejected under 35 U.S.C. §112, second paragraph, for the reasons noted at page 2 of the Office Action. Applicants respectfully traverse. Claims 1, 12-16, 37-39 and 52-53 have been amended to clarify the physical property of the dendritic macromolecule recited in the subject claims. The Examiner is respectfully requested to reconsider and withdraw the rejection under 35 U.S.C. §112, second paragraph.

Claims 3-5 and 7-9 were rejected under 35 U.S.C. §112, second paragraph, for the reasons noted at page 2 of the Office Action. Applicants respectfully traverse. Claims 3-5 and 7-9 have been amended to delete the language "of at least". The

Examiner is respectfully requested to reconsider and withdraw the rejection under 35 U.S.C. §112, second paragraph.

Claims 13, 15-17, 22, 23, 28, 30-32, 54 and 58-64 were rejected under 35 U.S.C. §112, second paragraph, for the reasons noted at page 3 of the Office Action. Applicants respectfully traverse. Claims 13, 15-17, 22, 23, 28, 30-32, 54 and 58-62 have been amended such that the materials recited in the claims are in the form of a proper Markush group. Claims 63-64 have not been amended at this time since, in the Applicants' view, these claims, per se, do not offend 35 U.S.C. §112, second paragraph. The Examiner is respectfully requested to reconsider and withdraw the rejection under 35 U.S.C. §112, second paragraph.

Claim 65 was rejected under 35 U.S.C. §112, second paragraph, for the reasons noted at page 3 of the Office Action. Applicants respectfully traverse. Claim 65 has been amended to clarify the physical property of the foam referred to in the preamble of the claim (supported, for example, in Paragraph 9 of the specification) and to clarify the property of the dendritic macromolecule referred to in the claim. The Examiner is respectfully requested to reconsider and withdraw the rejection under 35 U.S.C. §112, second paragraph.

The Examiner rejected Claims 1-65 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,316,514

(Falke et al., hereinafter "Falke") in view of U.S. Patent No. 6,114,458 (Hawker et al., hereinafter "Hawker"). This rejection is traversed. Reconsideration is requested in light of the following remarks.

In one of its aspects, the present invention, as defined by Claim 1 amended herein, relates to a foamed isocyanate-based polymer derived from a reaction mixture comprising an isocyanate, an active hydrogen-containing compound, a dendritic macromolecule and a blowing agent. The dendritic macromolecule for use in the reaction mixture is defined by its physical properties. Specifically, a mixture comprising at least about 15% by weight of the dendritic macromolecule and a polyether polyol having an OH number less than about 40 mg KOH/g forms a stable liquid at 23°C.

As stated in Paragraph 23 of the present application, dendritic macromolecules are generally known. At Paragraph 24 of the present application, the following statements are made:

"The present inventors have surprisingly and unexpectedly discovered that a sub-group of dendritic macromolecules is particularly advantageous to confer load building properties in an isocyanate-based foam. Indeed, as will be developed in the Examples hereinbelow, it is possible to utilize the sub-group of dendritic macromolecules to partially or fully displace copolymer polyols conventionally used to confer load building characteristics to isocyanate-based polymer foams. The sub-group of dendritic macromolecules is described in detail in copending United States patent application S.N. 60/221,512,

filed on July 28, 2000 in the name of Pettersson et al. and the contents of which are hereby incorporated by reference ."

Thus, Applicants submit that the claims of the present application are not directed to the use of any dendritic macromolecule in an isocyanate-based foam. Rather, a sub-group of dendritic macromolecules, which were not available prior to the filing date of the present application, have the surprising and unexpected advantage of conferring load building properties to an isocyanate-based foam.

Falke discloses production of sound-damping and energy-absorbing polyurethane foams. Specifically, such foams are purportedly made by reacting organic and/or modified organic polyisocyanates (a) with a polyetherol mixture (b) and, if desired, further compounds (c) bearing hydrogen atoms which are reactive toward isocyanates, in the presence of water and/or blowing agents (d), catalysts (e) and, if desired, further auxiliaries and additives (f). See column 1, lines 5-13. The further auxiliaries and/or additives (f) can be surface-active substances, foam stabilizers, cell regulators, fillers, dyes, pigments, flame retardants, hydrolysis inhibitors, fungistatic and bacteriostatic substances. See column 8, lines 39-45. In the paragraph at column 9, lines 18-45, Falke includes the following statement:

"For the purposes of the present invention, fillers, in particular reinforcement fillers, are the customary organic and inorganic fillers, reinforcing materials, weighting agents, agents for improving the abrasion behaviour in paints, coating compositions, etc., known per se."

Falke does not teach or suggest the use of any dendritic macromolecule, let alone the dendritic macromolecule having the physical properties defined in claims of the present application. This is acknowledged at page 4 of the Office Action.

Hawker discloses highly branched radial block copolymers. Hawker acknowledges the two United States patents referred to in Paragraph 23 of the present application. See column 1, lines 37-50. Hawker goes on to state that a drawback of the known highly branched macromolecules is the inability of the globular, densely packed structures of such macromolecules to entangle and provide suitable mechanical properties. In summarizing his invention, Hawker states the following:

"In order to overcome this and other problems, short linear chains, capable of entanglement, can be attached to the numerous chain ends of the dendritic macromolecules, effectively creating highly branched hybrid dendritic-linear block copolymers"

See column 1, lines 63-67.

At column 7, lines 56-67, as pointed out in the Office Action, Hawker does state that the copolymer of his invention, inter alia, may be used as "a viscosity modifier for linear polymers". This paragraph of purported applications of Hawker's copolymer does not make any mention of using the subject copolymers in foam for any purpose. Hawker does disclose the use of copolymers in the production of a polyurethane foam in Claim 16.

Notwithstanding this, there is nothing in Hawker that suggests that the block copolymer disclosed in Hawker can be used advantageously to produce isocyanate-based foams having improved load bearing properties. Further, there is no evidence that the block copolymers disclosed in Hawker fall within the scope of the dendritic macromolecules referred to in the claims of the present application.

Thus, it is Applicants' position that neither of Falke or Hawker, alone or in combination, teach or suggest a dendritic macromolecule having the properties set out in Claim 1 of the present application. Neither of these references teach or suggest any recognition of the use of such a dendritic macromolecule to improve the load bearing properties of an isocyanate-based foam.

Reliance on Hawker for the teaching of block copolymers to "impart viscosity modification" is not

particularly relevant to the notion of conveying load building properties to a foam. Specifically, as is well known in the art, a viscosity modifier will modify the viscosity, typically of a liquid system, in some predetermined manner. Thus, one might view a viscosity modifier as a processing aid during production of a final product. In contrast, the subset of dendritic macromolecules referred to above go beyond process aids and confer load building properties to the finished foam product. Hawker simply does not disclose any block copolymer which has such advantageous properties in a final foam product.

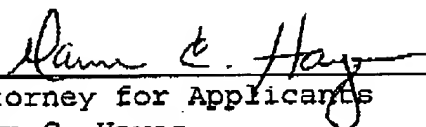
In light of the above remarks, Applicants respectfully request that the rejection of Claims 1-65 under 35 U.S.C. §103(a) as being purportedly unpatentable over Falke in view of Hawker be withdrawn.

In view of the above amendments and remarks, it is believed that this application is now in condition for allowance, and a Notice thereof is respectfully requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 625-3500. All

correspondence should continue to be directed to our address
given below.

Respectfully submitted,


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MARKED-UP CLAIMS

1. A foamed isocyanate-based polymer derived from a reaction mixture comprising an isocyanate, an active hydrogen-containing compound, a dendritic macromolecule and a blowing agent; wherein a mixture comprising at least [a] about 15% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number less than about 40 mg KOH/g [to form] forms a stable liquid at 23°C.

3. The foamed isocyanate-based polymer defined in claim 2, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of from about 15 to about 50 Newtons/weight % active hydrogen-containing compound.

4. The foamed isocyanate-based polymer defined in claim 2, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of from about 20 to about 45 Newtons/weight % active hydrogen-containing compound.

5. The foamed isocyanate-based polymer defined in claim 2, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of from about 25 to about 35 Newtons/weight % active hydrogen-containing compound.

6. A foamed isocyanate-based polymer having a cellular matrix derived from an active hydrogen-containing compound and comprising a plurality of interconnected struts, the cellular matrix: (i) having a load efficiency of at least about 15 Newtons/weight % active hydrogen-containing compound[.], and (ii) being substantially free of particulate material.

7. The foamed isocyanate-based polymer defined in claim 6, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of from about 15 to about 50 Newtons/weight % active hydrogen-containing compound.

8. The foamed isocyanate-based polymer defined in claim 6, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of

from about 20 to about 45 Newtons/weight % active hydrogen-containing compound.

9. The foamed isocyanate-based polymer defined in claim 6, wherein the active hydrogen-containing compound confers to the cellular matrix a load efficiency [of at least] in the range of from about 25 to about 35 Newtons/weight % active hydrogen-containing compound.

12. A process for producing a foamed isocyanate-based polymer comprising the steps of:

contacting an isocyanate, an active hydrogen-containing compound, a dendritic macromolecule and a blowing agent to form a reaction mixture; and

expanding the reaction mixture to produce the foamed isocyanate-based polymer;

wherein a mixture comprising at least [a] about 15% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number less than about 40 mg KOH/g [to form] forms a stable liquid at 23°C.

13. The process defined in claim 12, wherein the active hydrogen-containing compound is selected from the group

[comprising] consisting of polyols, polyamines, polyamides, polyimines and polyolamines.

15. The process defined in claim 14, wherein the polyol comprises a hydroxyl-terminated backbone of a member selected from the group [comprising] consisting of polyether, polyesters, polycarbonate, polydiene and polycaprolactone.

16. The process defined in claim 14, wherein the polyol is selected from the group [comprising] consisting of hydroxyl-terminated polyhydrocarbons, hydroxyl-terminated polyformals, fatty acid triglycerides, hydroxyl-terminated polyesters, hydroxymethyl-terminated polyesters, hydroxymethyl-terminated perfluoromethylenes, polyalkyleneether glycols, polyalkylenearyleneether glycols, polyalkyleneether triols and mixtures thereof.

17. The process defined in claim 14, wherein the polyol is selected from the group [comprising] consisting of adipic acid-ethylene glycol polyester, poly(butylene glycol), poly(propylene glycol) and hydroxyl-terminated polybutadiene.

22. The process defined in claim 12, wherein the active hydrogen-containing compound is selected from group [comprising] consisting of a polyamine and a polyalkanolamine.

23. The process defined in claim 22, wherein the polyamine is selected from the group [comprising] consisting of primary and secondary amine terminated polyethers.

28. The process defined in claim 12, wherein the isocyanate is selected from the group [comprising] consisting of hexamethylene diisocyanate, 1,8-diisocyanato-p-methane, xylyl diisocyanate, $(\text{OCNCH}_2\text{CH}_2\text{CH}_2\text{OCH}_2\text{O})_2$, 1-methyl-2,4-diisocyanatocyclohexane, phenylene diisocyanates, tolylene diisocyanates, chlorophenylene diisocyanates, diphenylmethane-4,4 -diisocyanate, naphthalene-1,5-diisocyanate, triphenylmethane-4,4 ,4 -triisocyanate, isopropylbenzene-alpha-4-diisocyanate and mixtures thereof.

30. The process defined in claim 12, wherein isocyanate is selected from the group [comprising] consisting of 1,6-hexamethylene diisocyanate, 1,4-butylene diisocyanate, furfurylidene diisocyanate, 2,4-toluene diisocyanate, 2,6-toluene diisocyanate, 2,4 -diphenylmethane diisocyanate, 4,4 -diphenylmethane diisocyanate, 4,4 -diphenylpropane diisocyanate,

4,4 -diphenyl-3,3 -dimethyl methane diisocyanate, 1,5-naphthalene diisocyanate, 1-methyl-2,4-diisocyanate-5-chlorobenzene, 2,4-diisocyanato-s-triazine, 1-methyl-2,4-diisocyanatocyclohexane, p-phenylene diisocyanate, m-phenylene diisocyanate, 1,4-naphthalene diisocyanate, dianisidine diisocyanate, bitolylene diisocyanate, 1,4-xylylene diisocyanate, 1,3-xylylene diisocyanate, bis-(4-isocyanatophenyl)methane, bis-(3-methyl-4-isocyanatophenyl)methane, polymethylene polyphenyl polyisocyanates and mixtures thereof.

31. The process defined in claim 12, wherein the isocyanate is selected from the group [comprising] consisting of 2,4-toluene diisocyanate, 2,6-toluene diisocyanate and mixtures thereof.

32. The process defined in claim 12, wherein the isocyanate is selected from the group consisting [essentially] of (i) 2,4 -diphenylmethane diisocyanate, 4,4 -diphenylmethane diisocyanate and mixtures thereof; and (ii) mixtures of (i) with an isocyanate selected from the group comprising 2,4-toluene diisocyanate, 2,6-toluene diisocyanate and mixtures thereof.

37. The process defined in claim 36, wherein a mixture comprising from about 15% to about 30% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number less than about 40 mg KOH/g [to form] forms a stable liquid at 23°C.

38. The process defined in claim 36, wherein a mixture comprising at least [a] about 15% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number in the range of from about 25 to 35 mg KOH/g [to form] forms a stable liquid at 23°C.

39. The process defined in claim 36, wherein a mixture comprising at least [a] about 15% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number in the range of from about 28 to 32 mg KOH/g [to form] forms a stable liquid at 23°C.

52. The process defined in claim 36, wherein a mixture comprising from about 15% to about 50% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number less than about 40 mg KOH/g [to form] forms a stable liquid at 23°C.

53. The process defined in claim 36, wherein a mixture comprising from about 15% to about 40% by weight of the dendritic macromolecule [may be mixed with] and a polyether polyol having an OH number less than about 40 mg KOH/g [to form] forms a stable liquid at 23°C.

54. The process defined in claim 36, wherein the macromolecule has an inherently branched structure [comprising] consisting of at least one of an ester moiety, an ether moiety, an amine moiety, an amide moiety and any mixtures thereof.

58. The process defined in claim 54, wherein the macromolecule further [comprises] consists of a nucleus to which the inherently branched structure is chemically bonded.

60. The process defined in claim 54, wherein the inherently branched structure [further comprises] has at least one chain stopper moiety chemically bonded thereto.

61. The process defined in claim 54, wherein the inherently branched structure [further comprises] has at least two different chain stopper moieties chemically bonded thereto.